

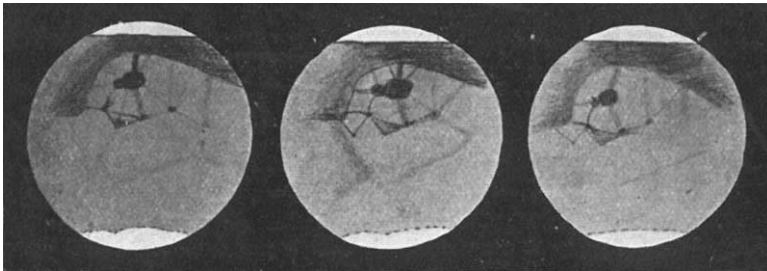
MARS, IN 1907.

OBSERVATIONS AT THE LOWELL OBSERVATORY.

IN answer to the request of the editor of NATURE for an authoritative statement of the observations so far made here at this opposition, I have the honour to communicate two or three of the more important results obtained. They exceed what seemed likely, in view of the unfavourable declination of the planet, a position so southern as to render it practically unobservable in England, France, or the northern part of the United States.

The first of these relates to the polar caps. From the fact that the observations were begun in March, three months and a half before opposition, it was possible to catch both caps at an interesting phase of their careers—the southern one at its maximum, the northern at its minimum, extent. The moment was more propitious than has ever been the case before at the times at which the planet has been observed, because it was then upon an even keel as regards the earth, the equator lying nearly in the plane of sight. The southern cap at this epoch stretched across ninety-five degrees of latitude, counting from one side of it to the other; the northern only over eight.

From that date the dwindling of the southern cap and the making of the northern has been carefully watched to a complete confirmation of the curious manner in which the latter is formed, as witnessed here at the two previous oppositions.¹



Photographs of Mars in 1907.

The next point has been the observed development of the canal system in the antarctic and south temperate zones. After the melting of the south polar cap had got well under way, canals began to make their appearance about it, running thence down the disc. These canals left its edge and joined the rest of the system in lower latitudes. Connected with such polar phenomena was the appearance of the most southern of the light regions of the planet, Thaumasia. This region, lying around the Solis Lacus, or Lake of the Sun, first showed symptoms of awaking activity. The Solis Lacus stood composed of two portions, a large oval patch on the east and a smaller round one to the west; from both of which canals ran into the dark areas. Now those on the south, such as the Ambrosia and the Bathys, were darker and more pronounced than those running north, the Tithonius, for example, which showed evidence of being in its dead or skeleton condition, while the former were in full tide of development. Meanwhile, the equatorial canals were steadily fading out. The process of evolution was in keeping with the method of development found here for the northern canals in 1903. The fact is of the nature of a prophecy fulfilled, and not only supports the previous observations, but proves the theory deduced from them to have been correct. It

¹ See Lowell Observatory Bulletin 30.

is a direct *sequitur* from this that the planet is at present the abode of intelligent, constructive life.

I may say in this connection that the theory of such life upon Mars was in no way an *a priori* hypothesis on my part, but the deduced outcome of observation, and that my observations since have fully confirmed it. No other supposition is consonant with all the facts observed here.

Another result of this opposition has been the success of the photographs taken of the planet. These have proved delineatory beyond expectation. The increased size of disc has enabled the method worked up by Mr. Lampland to be put into even more effective practice than at the last opposition. Plates have been taken by both Mr. Lampland and myself, and the amount of detail they show may be judged from the fact that I have already counted fifty-six canals on my plates, that the twin Gihon has been photographed double, and that such delicate markings as the Fons Juventae and the little canals leading to it appear unmistakably in the prints. Such grosser matters as the dwindling of the southern snow-cap show beautifully, and it looks as if a result in which Mr. Crommelin was much interested, the positioning of points of Martian topography by measures of the photographs, was in process of realisation.

Of the success of the expedition to the Andes to observe and photograph the planet sent out by this observatory under Prof. Todd, and with Mr. E. C. Slipher as the photographer, I prefer to speak later when fuller details come to hand. We already know by cable that their success has been beyond expectation.

PERCIVAL LOWELL.

PROF. H. C. VOGEL.

ASTRONOMERS, and especially spectroscopists, will have received with profound regret the brief announcement from the Potsdam Observatory which conveyed the sad intelligence that Prof. H. C. Vogel, the director of that institution, had died on August 13.

His scientific life extends over a period during which all the great triumphs of the spectroscopy have been won, and he has been in the front rank of that energetic band of astronomers who have given new direction and increased interest to the science of astronomy. Hence to sketch his life would be to trace the history of spectroscopy from the time that Ångström published the map of the normal spectrum, or from that of the epoch-marking Indian eclipse, when the riddle of the chromosphere was first read; when the application of the Doppler principle was first applied to star spectra; or when cometary spectra were first studied. Men's minds were still excited over these novel pursuits, and the possibilities they suggested, when Vogel took charge of the Bothkamp Observatory and began that career of continued and successful observation which only terminated with his death. How much has been accomplished since will be appreciated if we recall the fact, that Vogel's earliest work gave us accurate information of the peculiarities of the planetary spectra, and showed the effect of solar rotation in displacing the Fraunhofer lines.

In 1874 came the foundation of the Potsdam Observatory, and Prof. Vogel was seen in a new light as the director of the first purely astrophysical observatory. The staff was small, and the instruments

were modest, but enthusiasm was great, and the outcome has been of the widest interest. One of the early fruits from this new observatory was the spectrum catalogue of 4051 stars, important, not only because it illustrated the manner in which large masses of work could be dealt with in the new institution, but for the extensive application of the method of classifying stellar spectra to which the name of Vogel is particularly attached. He early appreciated the probability that the phase of development of a particular star was in general mirrored in its spectrum, and that any rational classification of the stars could only be obtained by giving prominence to that central fact.

Another class of work which largely occupied Prof. Vogel's attention was his investigation by means of photography of the motions in the line of sight of all the brighter stars visible in Potsdam. If he was not the first to apply photography in this particular direction, he was certainly among the most successful. This success was due in a great measure to the fact that he recognised, more fully than was generally the case thirty years ago, the necessity of constructing an instrument to a definite end, of making it exclusively available for one particular object. The possession of the most suitable apparatus not only gave improved and consistent values for the motion of stars in the line of sight, but satisfactorily explained the cause of the variability of Algol and stars of that type. His determination of the elements of that spectroscopic binary is typical of an immense amount of work which Vogel effected in the case of many other binaries. In observing variable and temporary stars his energy found another large field for its display, but it is impossible to enter into details. His was a busy life with many interests, and he assisted science in various directions.

Although aided by able and zealous colleagues, he was responsible as director of the observatory for the conduct of several large pieces of work. It will be sufficient to refer here to his participation in the work of the International Chart of the Heavens, to which in its early days he devoted much attention. The rigorous determination of the magnitude of all the brighter stars in the *Bonn Durchmusterung* by means of the Zöllner photometer is another piece of heavy observation which he brought to a successful issue. Simultaneously with the steady progress of these and other inquiries has gone the remodelling of the observatory, and the substitution of larger and more powerful instruments for those which tended to grow obsolete. The mounting of the 80-centimetre refractor offers a proof of the care and foresight which he devoted to this part of his duties.

We believe that when the effect of Vogel's work is considered and judged, his capacity as a director must be fully and generously recognised. As guardian of a new institution for which there were no traditions to guide the future development, as a conductor of an untried experiment, uncertain in what direction progress might be anticipated, he has maintained the observatory at a uniformly high level, and produced a quantity of work of the most accurate character. This has been shown to some extent by his election into many learned societies, the members of which have appreciated his work and acknowledged his influence. He has left an example to be followed, and a reputation to be honoured. To his colleagues, some of whom have served with him many years, and who have suffered the loss of his experience and his kindly assistance, we offer our respectful sympathies.

W. E. P.

NOTES.

It is announced in the *Electrician* that the "John Scott Legacy Medal and Premium" of the Franklin Institute has been awarded to Prof. J. A. Ewing, F.R.S., and Mr. L. H. Walter for their method of detecting electrical oscillations.

THE programme of proceedings of the forthcoming meeting (on September 23 and 24) of the Iron and Steel Institute in Vienna has now been issued; from it we learn that the following papers may be expected to be submitted:—on the development of the iron industry of Austria since 1882, by W. Kestranek; on the Styrian Erzberg iron-ore mines, by Prof. H. Baerman; on steel and meteoric iron, by Prof. F. Berwerth; on the determination of the quantity of blast-furnace gas for a given make of pig iron, by Prof. Josef von Ehrenwerth; on the application of the laws of physical chemistry to the metallurgy of iron, by Baron H. von Jüptner; on case hardening of mild steel, by C. O. Bannister and J. W. Lambert; on a new blue-black paint as a protective covering for iron, by F. J. R. Carulla; on the hardening of steel, by L. Demozy; on the structure of hardened steel, by Percy Longmuir; on case hardening, by G. Shaw Scott; on the ageing of mild steel: further notes, by C. E. Stromeyer; and on the economical distribution of electric power from blast furnaces, by B. H. Thwaite.

PRINCE HENRY ZU SCHÖNAICH-CAROLATH has consented to act as president of the fourteenth International Congress for Hygiene and Demography, which is to take place in Berlin next month, and Dr. Rubner, Privy Councillor of Medicine and professor of hygiene at the Royal University of Berlin, and Prof. von Mayr, Under-Secretary of State, Munich, will be vice-presidents.

THE eleventh congress of Flemish naturalists will be held from September 21 to 23 at Malines under the presidency of Prof. C. de Bruyn, professor of botany and zoology in the University of Ghent. The secretary of the congress is Dr. de Bruycker, place du Grand-Canon, Ghent.

AN International Exhibition is to be held in Tokio from April 1 to October 15 of next year. The estimated cost is 2,000,000l., towards which the Japanese Government has set aside 1,000,000l.

ACCORDING to a telegram in the *Times*, two sharp shocks of earthquake occurred at 4.32 of the afternoon of August 22 at Kingston, Jamaica.

PARTICULARS of the préparations in progress for the Wellman Polar Expedition are given in a *Reuter* message dated from Spitsbergen, July 25, from which we learn it was expected that the expedition would be ready to start for the far north by the middle of August. One of the many difficult pieces of work which had to be accomplished was the packing and making ready for the *America* of the two "serpents" which form an important part of the project. One of the serpents—a pipe of strong, water-tight leather, 6 inches in diameter and 123 feet long, its outside surface covered with more than 29,000 steel scales, each about as big as a silver quarter, very thin, and riveted to the leather, overlapping like the scales of a fish—has been designed to have the smallest possible resistance in sliding over the ice or snow, or floating on the water, in which element it is buoyant. The retarder serpent, on the other hand, is designed to make the